

Student Name: _____



Missouri

Missouri Department of Elementary and Secondary Education

End-of-Course Assessment

Algebra II



Released 2009



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Directions to the Student

Today you will be taking the Missouri Algebra II Test. This is a test of how well you understand the course level expectations for Algebra II.

There are several important things to remember:

- 1** Read each question carefully and think about the answer. Then choose the one answer that you think is best.
- 2** Make sure you completely fill in the bubble for the answer on your answer sheet with a number 2 pencil.
- 3** If you do not know the answer to a question, skip it and go on. You may return to it later if you have time.
- 4** If you finish the test early, you may check over your work.
- 5** Do NOT write any answers in your test booklet. Mark your answers directly on your answer sheet with a number 2 pencil.

1. The table below gives the diameter of several bacteria cells.

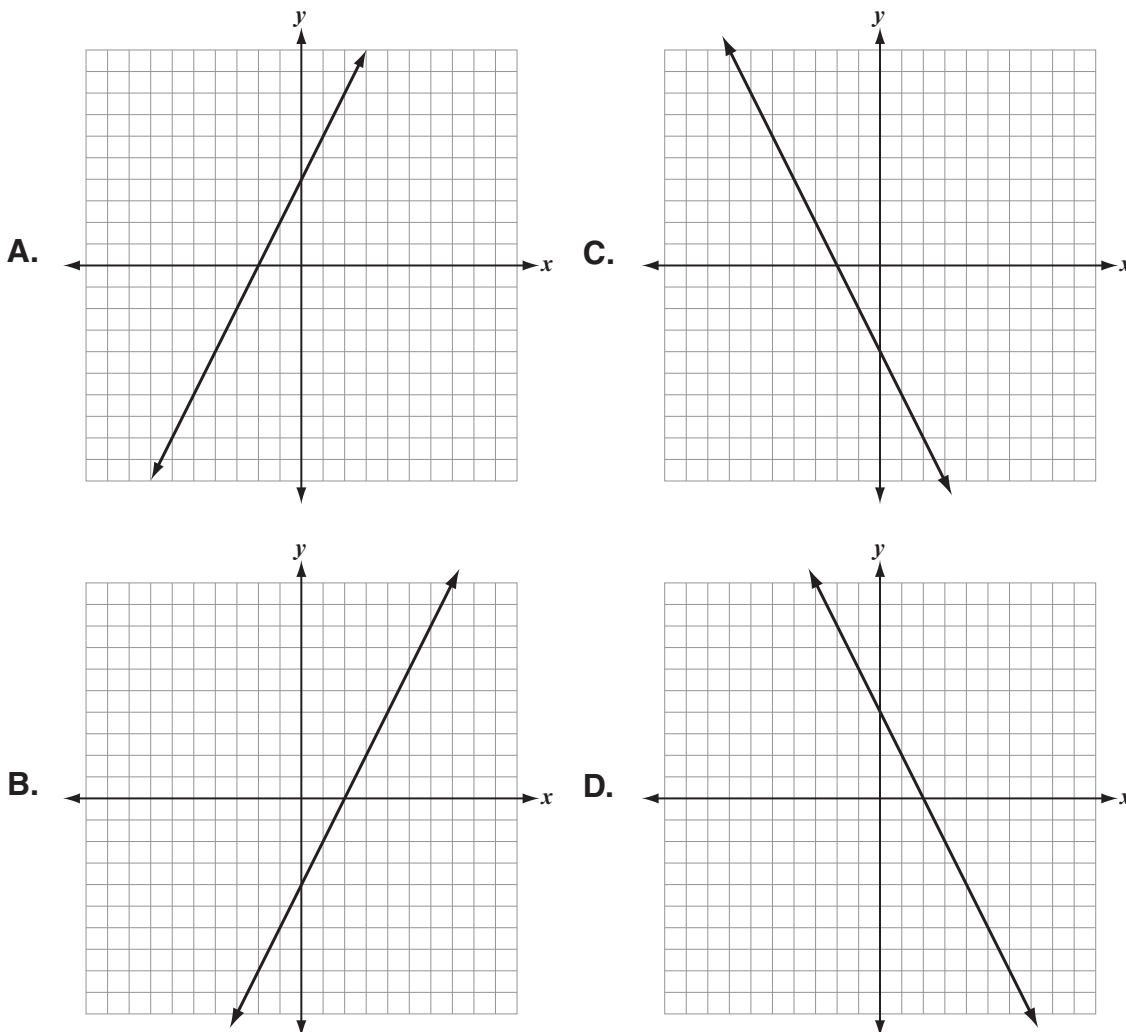
Diameter of Bacteria Cells

Cell A	3.6×10^{-2}
Cell B	3.64×10^{-1}
Cell C	3.714×10^{-4}
Cell D	3.05×10^{-3}

Which cell has the smallest diameter?

- A.** Cell A
- B.** Cell B
- C.** Cell C
- D.** Cell D

2. Which graph represents the same pattern as $4x - 2y = -8$?



3. Jim had a goal of riding his bike for an average (mean) of 90 miles each week. The number of miles he rode each of the first four weeks were 87, 81, 92, and 95. Which value is the minimum number of miles he must ride during the fifth week to meet his goal?

- A. 89
- B. 91
- C. 95
- D. 102

4. Between $x = 0$ and $x = 1$, which function has a greater average rate of change than $y = 2^x$?

- A. $y = 4^x$
- B. $y = -2^x$
- C. $y = 2^{x-4}$
- D. $y = 2^x + 4$

5. What is the value of y in the solution to the system?

$$\begin{aligned}4x - y &= 4 \\6x - 5y &= -1\end{aligned}$$

- A. -2
 - B. 1.5
 - C. 2
 - D. 8
6. Rick found a T-shirt on sale for 40% off the clearance price. The clearance price was already 25% off the original price. The original price was \$32.00. How much did Rick pay for the shirt if there is a tax rate of 7.25%?
- A. \$11.20
 - B. \$12.01
 - C. \$14.40
 - D. \$15.44

7. What are the solutions of $x^2 - 6x = -21$?



A. $x = 3 \pm \sqrt{30}$

B. $x = 3 \pm 2i\sqrt{3}$

C. $x = -3 \pm 2i\sqrt{3}$

D. $x = -3 \pm i\sqrt{30}$

8. The TV weather forecaster announces that one location has a 45% chance of rain tomorrow and a 10% chance of snow. What is the probability that it will rain *or* snow tomorrow in this location?



A. $\frac{9}{200}$

B. $\frac{7}{20}$

C. $\frac{9}{20}$

D. $\frac{11}{20}$

9. Which expression shows the complete factorization of $8ax^2 + 14ax - 15a$?

A. $a(4x + 3)(2x - 5)$

B. $(8x + 3)(x - 5)$

C. $a(8x + 3)(x - 5)$

D. $a(4x - 3)(2x + 5)$

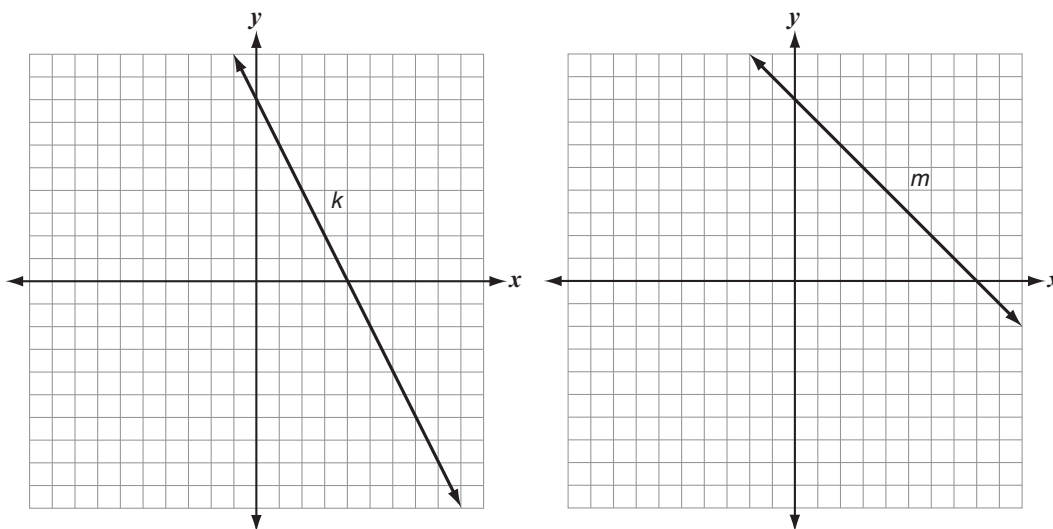
10. After viewing the test scores of an Algebra II class, Ms. Dorsey decided to grade students based on the median score and the variability of the scores. Which graph would *best* help her decide how to grade the students?

- A. box-and-whisker plot
- B. frequency table
- C. stem-and-leaf
- D. line plot

11. What is the solution to $4(3x - 6) + 16 < -32$?

- A. $x < -2$
- B. $x > -2$
- C. $x < -3.5$
- D. $x > -3.5$

12. In the graphs below, how is line m different from line k ?



- A. The slope is steeper, and it has a greater x-intercept.
 - B. The slope is steeper, and it has a greater y-intercept.
 - C. The slope is less steep, and it has a greater x-intercept.
 - D. The slope is less steep, and it has a greater y-intercept.
13. What is the mean of the data below after the outlier is removed from the set?

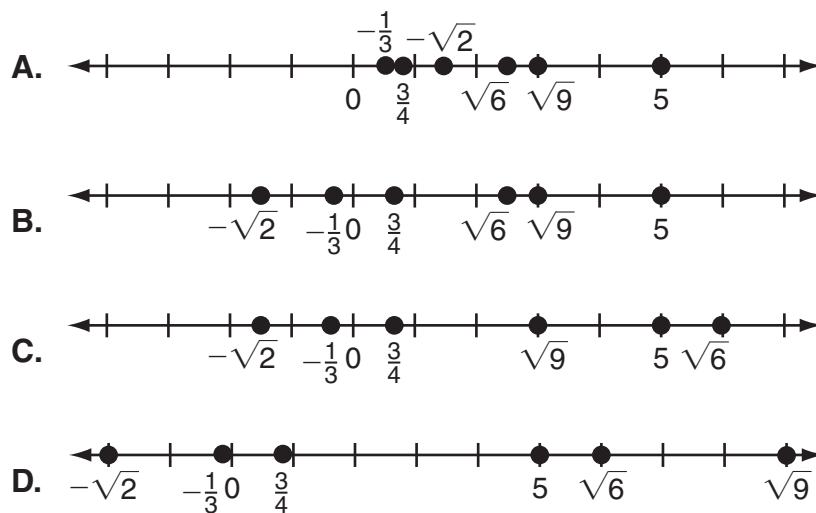
$\{73, 85, 70, 86, 75, 90, 23, 74\}$

- A. 69
- B. 72
- C. 75
- D. 79

14. Melanie needs to graph this set of numbers on a number line.

$$\left\{\sqrt{9}, \frac{3}{4}, -\frac{1}{3}, 5, -\sqrt{2}, \sqrt{6}\right\}$$

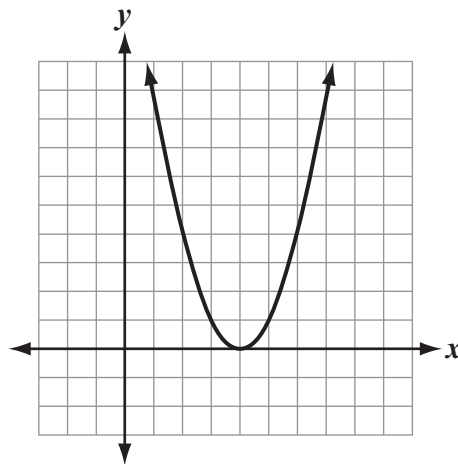
Which number line shows the set graphed correctly?



15. Which expression is the simplified form of $\left(\frac{6x^{-4}y^3}{2x^{-1}y^3}\right)^2$?

- A. $\frac{6}{x^6}$
- B. $\frac{9}{x^6}$
- C. $\frac{9}{x^{10}}$
- D. $3x^{15}$

16. Which function is represented by the graph below?



- A. $y = (x - 4)^4$
- B. $y = |x - 4|$
- C. $y = x^2 - 4$
- D. $y = (x - 4)^2$

17. A fair coin is tossed, and a six-sided number cube is rolled. How many different outcomes are possible?

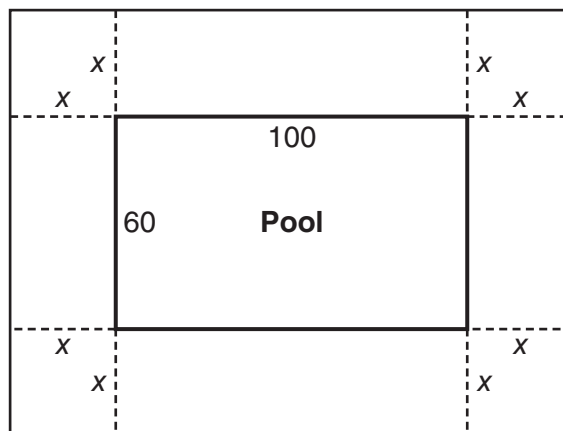
- A. 2
- B. 8
- C. 12
- D. 36

18. The first 5 terms of a sequence are -3 , 0 , 6 , 18 , and 42 . What is the eighth term of this sequence?



- A. 90
- B. 114
- C. 186
- D. 378

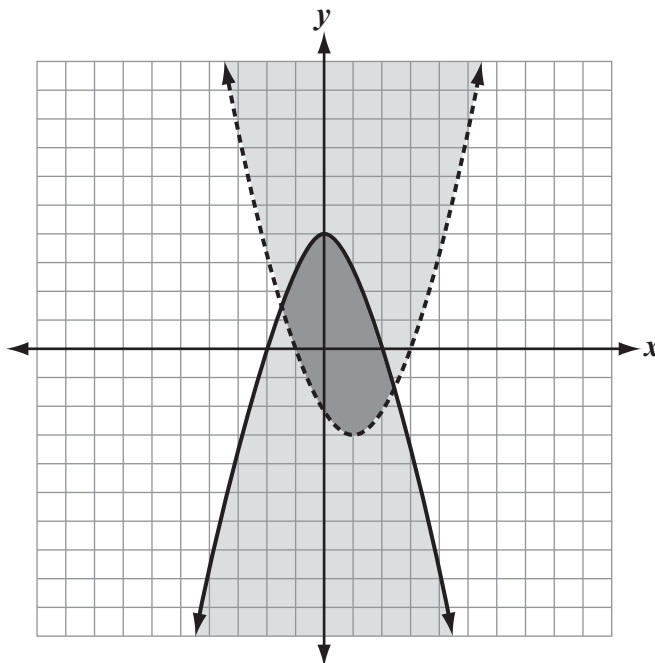
19. Marge wants to build a sidewalk of uniform width around a rectangular swimming pool that is 100 feet long and 60 feet wide. She has 1,700 square feet of concrete to create the sidewalk. (Area = lw)



What should be the width of the sidewalk?

- A. 5 feet
- B. 6 feet
- C. 8 feet
- D. 10 feet

20. Which ordered pair is a solution to the graphed system?



- A. $(-2, -3)$
- B. $(-1, 2)$
- C. $(1, -3)$
- D. $(2, 3)$

21. What is the vertical asymptote of the graph of $y = \log_4(x - 3)$?

- A. $x = -3$
- B. $x = 0$
- C. $x = 3$
- D. $x = 4$

22. Company A's public relations manager needs information for an ad campaign. The monthly profits through August for Company A are given in the table below.

Monthly Profits

Company A
\$2,750,000
\$2,900,000
\$2,850,000
\$2,750,000
\$2,900,000
\$2,750,000
\$3,150,000
\$2,850,000

Which measure would *best* emphasize the success of the company?

- A. mean
- B. median
- C. mode
- D. range

23. What is the value of x in the equation below?

$$2(10x + 8) - 1 = 5(x - 6)$$

A. $x = -3$

B. $x = -\frac{13}{15}$

C. $x = \frac{3}{5}$

D. $x = 3$

24. How are functions f and g alike?

$$f(x) = x(x + 3)(x + 5)$$

$$g(x) = x^3 + x^2 + 2x + 24$$

A. They both have 3 real zeros.

B. They are both cubic functions.

C. They both have an imaginary root.

D. They are both exponential functions.

25. If $x = 2$ and $y = 3$, what is the value of $\frac{3x^2y^0}{5x^{-1}y^2}$?

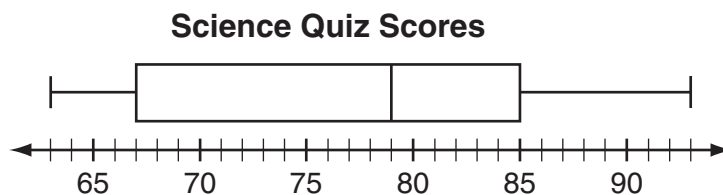
A. 0

B. $\frac{2}{15}$

C. $\frac{8}{15}$

D. $\frac{24}{25}$

26. How does the graph of the function $f(x) = x^3 + 1$ compare to the parent function $f(x) = x^3$?
- A. shifted up 1 unit
 - B. shifted down 1 unit
 - C. shifted left 1 unit
 - D. shifted right 1 unit
27. A class of twenty students was to take a science quiz. Four students were absent. The teacher created the following box-and-whisker plot of the 16 scores she received.



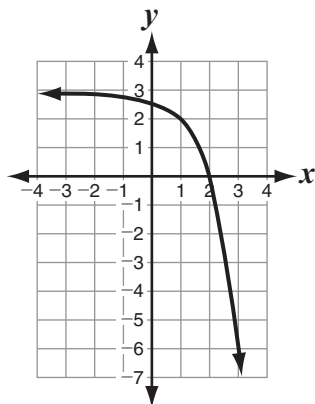
The next day the 4 absent students took the quiz. If their scores were 63, 64, 92, and 93, what effect would this have on the lower quartile, the median, and the upper quartile?

- A. The median would increase, but the upper and lower quartile would stay the same.
- B. The median would increase, the upper quartile would decrease, and the lower quartile would increase.
- C. The median would stay the same, the upper quartile would decrease, and the lower quartile would increase.
- D. The median would stay the same, the upper quartile would increase or stay the same, and the lower quartile would decrease or stay the same.

28. Ms. Juarez showed the graphs of the functions $y = \log_2 x$ and $y = \log_4 x$ to her students. Which conclusion is *incorrect*?

- A. The x -intercept of each graph is 0.
- B. The graphs never intersect the y -axis.
- C. The domain of each function is $\{x : x > 0\}$.
- D. The range of each function is $\{y : \text{all real numbers}\}$.

29. Which function is represented by the graph?



- A. $y = -3^x + 3$
- B. $y = -\left(\frac{1}{3}\right)^x + 3$
- C. $y = -3^{x-1} + 3$
- D. $y = -\left(\frac{1}{3}\right)^{x-1} + 3$

30. Which data set has a mean less than or equal to 80, a median of 40, and a mode of 75?

- A. {25, 30, 35, 40, 74, 75, 80}
- B. {15, 40, 40, 75, 76, 77, 80}
- C. {0, 38, 39, 40, 75, 75, 300}
- D. {20, 30, 35, 40, 75, 75, 100}

31. Which list shows the numbers $-\sqrt{8}$, $|-8|$, $\frac{1}{8}$, -8.35 , $\sqrt[3]{8}$, and $-8\frac{3}{5}$ in ascending order?

- A. $-8\frac{3}{5}$, -8.35 , $|-8|$, $-\sqrt{8}$, $\frac{1}{8}$, $\sqrt[3]{8}$
- B. $-8\frac{3}{5}$, -8.35 , $-\sqrt{8}$, $\frac{1}{8}$, $\sqrt[3]{8}$, $|-8|$
- C. -8.35 , $-8\frac{3}{5}$, $-\sqrt{8}$, $\frac{1}{8}$, $\sqrt[3]{8}$, $|-8|$
- D. $|-8|$, $\sqrt[3]{8}$, $\frac{1}{8}$, $-\sqrt{8}$, -8.35 , $-8\frac{3}{5}$

32. In an experiment, the distance traveled by an object varies directly with the rate the object is traveling. Which type of function would be used to represent this relationship?

- A. cubic
- B. linear
- C. quadratic
- D. absolute value

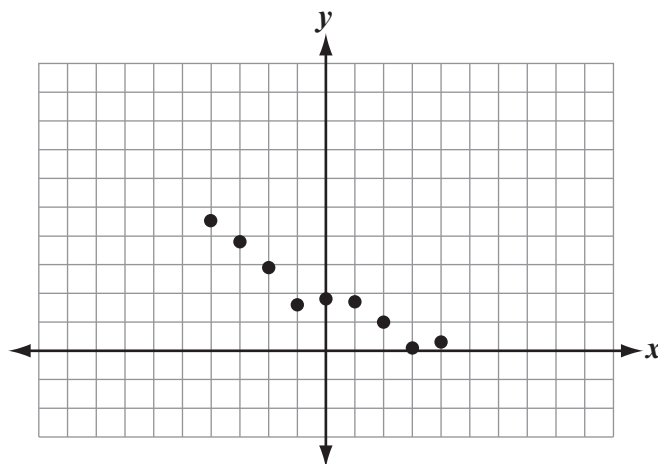
33. What is the solution to $|x - 3| = 7$?

- A. $x = -10, 4$
- B. $x = -10, 10$
- C. $x = -4, 4$
- D. $x = -4, 10$

34. Which equation represents the graph of a parabola that opens up and is wider than the graph of $y = x^2$?

- A. $y = 2x^2 + 3x - 5$
- B. $y = \frac{1}{2}x^2 + 3x - 5$
- C. $y = -2x^2 + 3x - 5$
- D. $y = -\frac{1}{2}x^2 + 3x - 5$

35. Which equation *best* models the data in the scatterplot?



- A. $y = -x + 2$
- B. $y = -2x + 2$
- C. $y = -\frac{1}{2}x + 2$
- D. $y = -\frac{1}{4}x + 1$

36. Which value of x is the solution to $100^{x+6} = 1000^{2x+3}$?

- A. $\frac{3}{10}$
- B. $\frac{3}{4}$
- C. 3
- D. 30

37. Which recursive rule describes the sequence 3, 7, 11, 15, ... ?



a_1 = first term
 a_n = n th term
 a_{n-1} = previous term

- A. $\begin{cases} a_1 = 3 \\ a_n = 3a_{n-1} - 2 \end{cases}$
- B. $\begin{cases} a_1 = 3 \\ a_n = 4a_{n-1} - 5 \end{cases}$
- C. $\begin{cases} a_1 = 3 \\ a_n = 2a_{n-1} + 1 \end{cases}$
- D. $\begin{cases} a_1 = 3 \\ a_n = a_{n-1} + 4 \end{cases}$

38. Ms. Smith has 30 students in her class: 20 are boys and 10 are girls. Mr. Jones also has 30 students in his class: 15 are boys and 15 are girls. One student is selected from each class to be on the student council. What is the probability that 2 boys are selected?

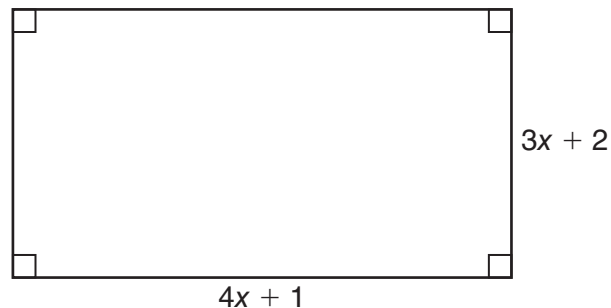


- A. $\frac{1}{6}$
- B. $\frac{1}{3}$
- C. $\frac{1}{2}$
- D. $\frac{7}{12}$

39. Tickets for the school play cost \$5 for adults and \$3 for students. On opening night, 150 tickets were sold and \$560 was collected. How much was collected from the sale of student tickets?

A. \$55
B. \$95
C. \$275
D. \$285

40. The dimensions of a rectangle are given in the diagram below.



If $x = \sqrt{7}$, what is the perimeter of the rectangle?

A. $3 + 7\sqrt{7}$
B. $10\sqrt{7}$
C. $6 + 14\sqrt{7}$
D. $20\sqrt{7}$

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